CHAPTER 2

DESCRIPTION OF THE SOUTH FORK CUMBERLAND RIVER WATERSHED

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2.1. BACKGROUND. The South Fork Cumberland River Watershed, also referred to as the Big South Fork Watershed, is named after a prominent river in the watershed. The watershed features a park spanning Tennessee and Kentucky, the Big South Fork National River and Recreation Area, administered by the National Park Service.

The Big South Fork of the Cumberland River is a major drainage feature of the Cumberland Plateau, a major tributary of the Cumberland system, a world-class whitewater canoeing and kayaking stream.

The Big South Fork is formed by the confluence of the New River and the Clear Fork River at the southern end of the Big South Fork National Recreation Area. From here, the river runs roughly north. This area is extremely remote. The river flows through a

deep gorge which has been eroded through sandstone. Many rapids features have names by which they are well known in the whitewater community.

This Chapter describes the location and characteristics of the South Fork Cumberland River Watershed.

2.2. DESCRIPTION OF THE WATERSHED.

2.2.A. General Location. The Tennessee portion of the South Fork Cumberland River Watershed is located in East Tennessee and includes parts of Anderson, Campbell, Fentress, Morgan, Pickett, and Scott Counties.

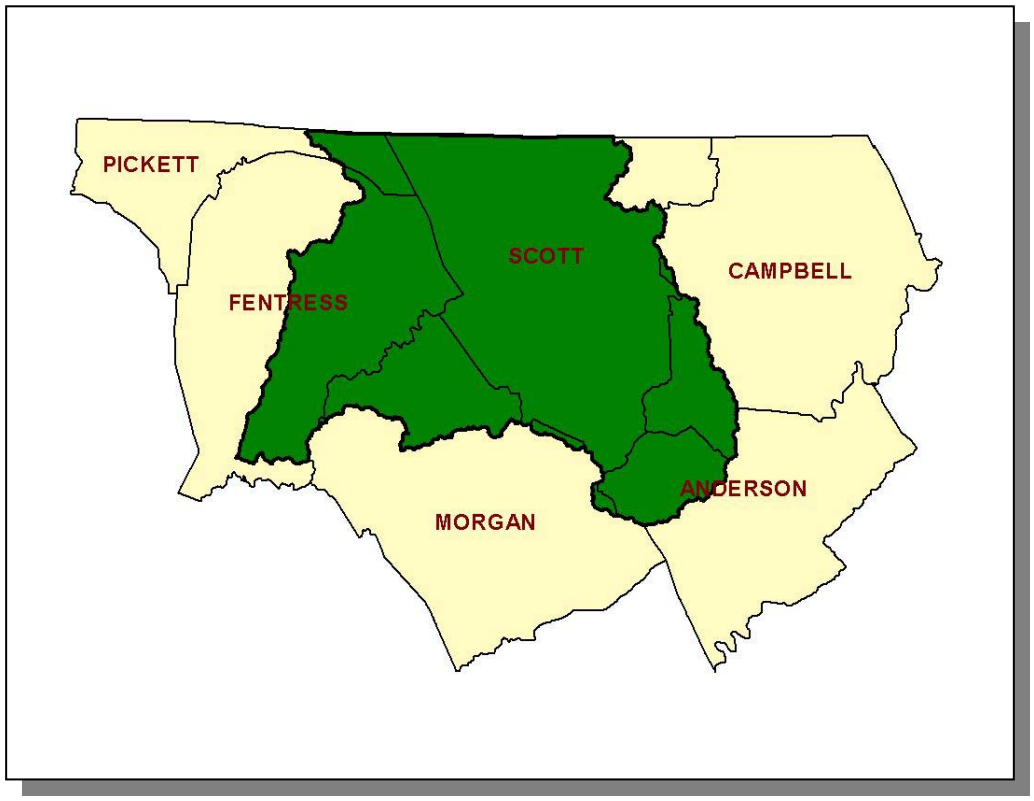

Figure 2-1. General Location of the Tennessee Portion of the South Fork Cumberland River Watershed.

COUNTY	% OF WATERSHED IN EACH COUNTY
Scott	49.4
Fentress	23.5
Morgan	11.1
Campbell	6.7
Anderson	6.5
Pickett	2.8

Table 2-1. The South Fork Cumberland River Watershed Includes Parts of Six East Tennessee Counties.

2.2.B. Population Density Centers. Eight highways serve the major communities in the Tennessee portion of the South Fork Cumberland River Watershed.

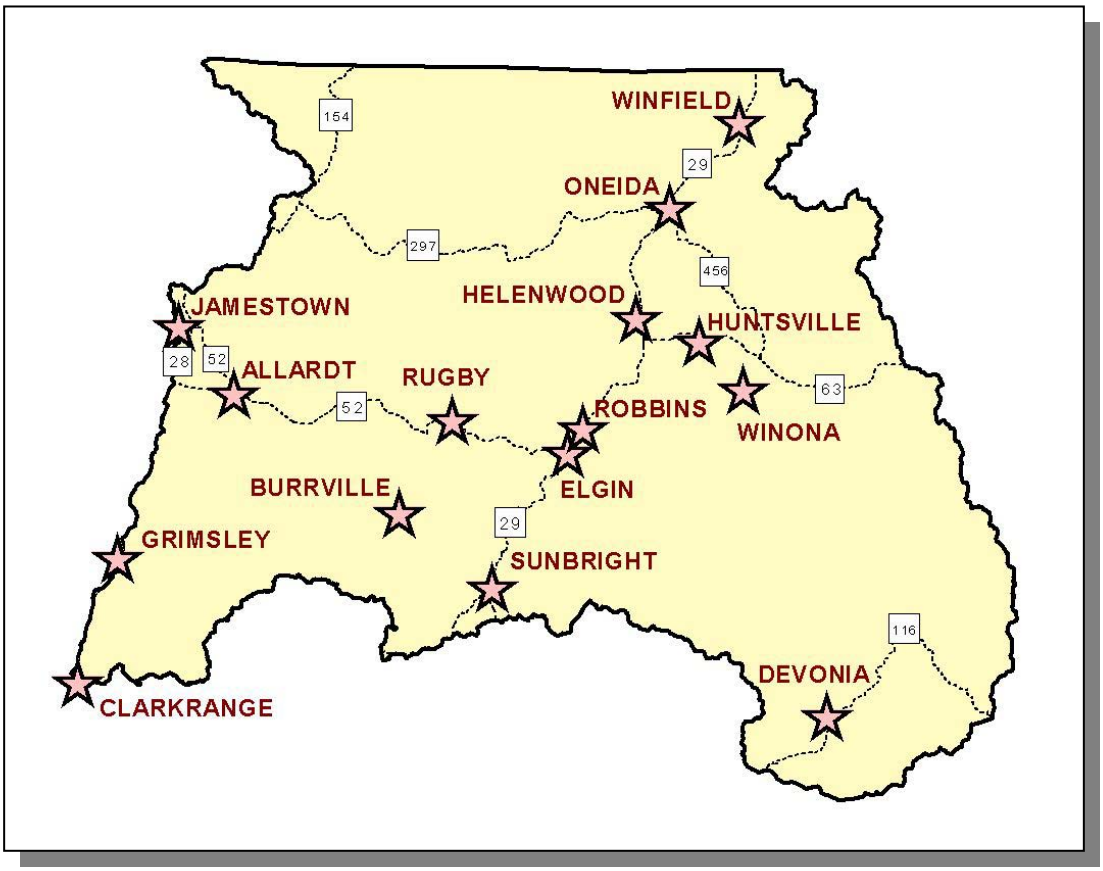

Figure 2-2. Communities and Roads in the Tennessee Portion of the South Fork Cumberland River Watershed.

MUNICIPALITY	POPULATION	COUNTY
Oneida	3,615	Oneida
Jamestown*	1,839	Fentress
Huntsville*	1,116	Scott
Winfield	911	Scott
Helenwood	846	Scott
Allardt	642	Fentress
Sunbright	577	Morgan
Elgin	229	Scott

Table 2-2. Municipalities in the Tennessee Portion of the South Fork Cumberland River Watershed. *Population based on 2000 census (Tennessee Blue Book) or http://www.hometownlocator.com. Asterisk (*) indicates county seat.*

2.3. GENERAL HYDROLOGIC DESCRIPTION.

2.3.A. Hydrology. The South Fork Cumberland River Watershed, designated 05130104 by the USGS, is approximately 1,365 square miles (976 square miles in Tennessee) and drains to the Cumberland River.

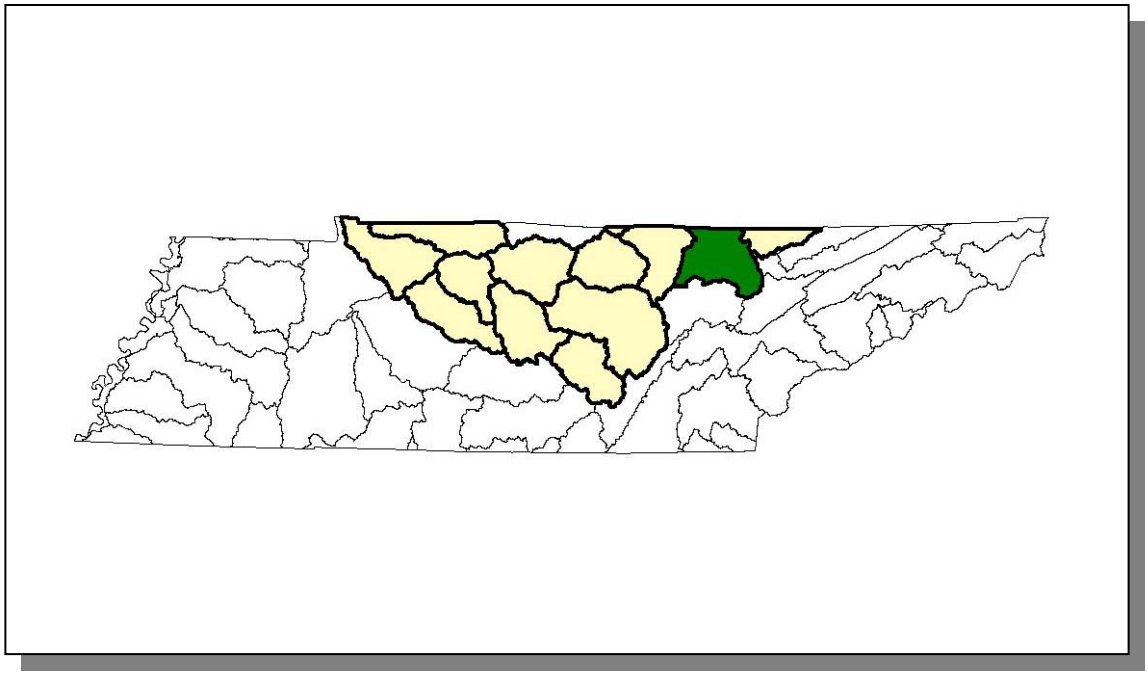

Figure 2-3. The South Fork Cumberland River Watershed is Part of the Cumberland River Basin.

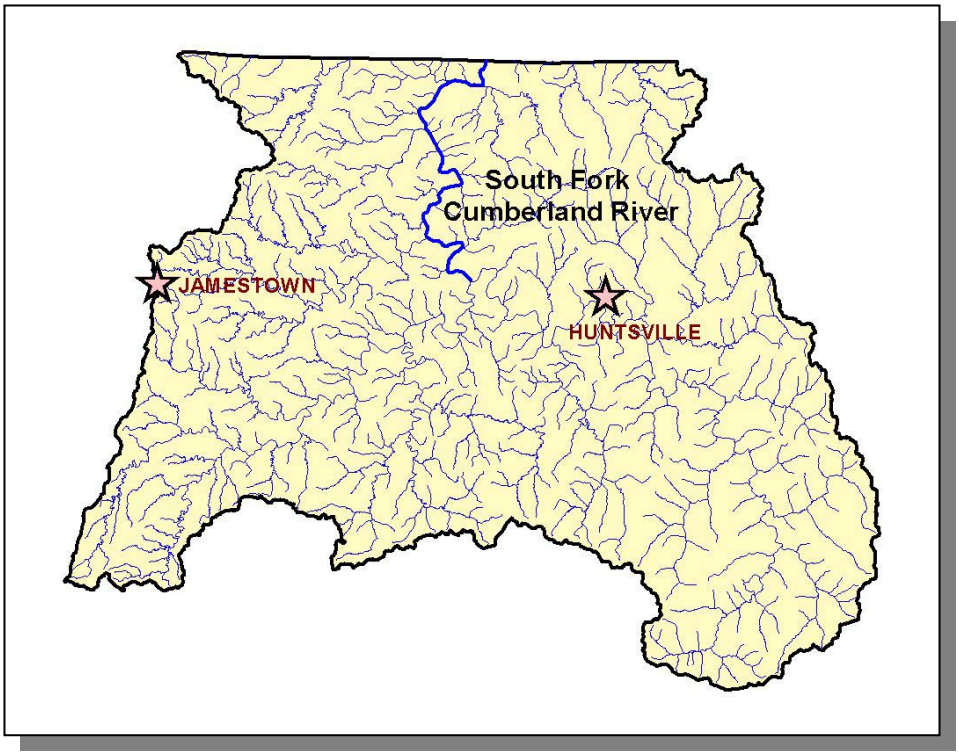

Figure 2-4. Hydrology in the Tennessee Portion of the South Fork Cumberland River Watershed. *There are 1,378.0 stream miles and 5 lake acres recorded in River Reach File 3 in the Tennessee portion of the South Fork Cumberland River Watershed. Location of the South Fork Cumberland River and the cities of Huntsville and Jamestown are shown for reference.*

2.3.B. Dams. There are 24 dams inventoried by TDEC Division of Water Supply in the Tennessee portion of the South Fork Cumberland River Watershed. These dams either retain 30 acre-feet of water or have structures at least 20 feet high.

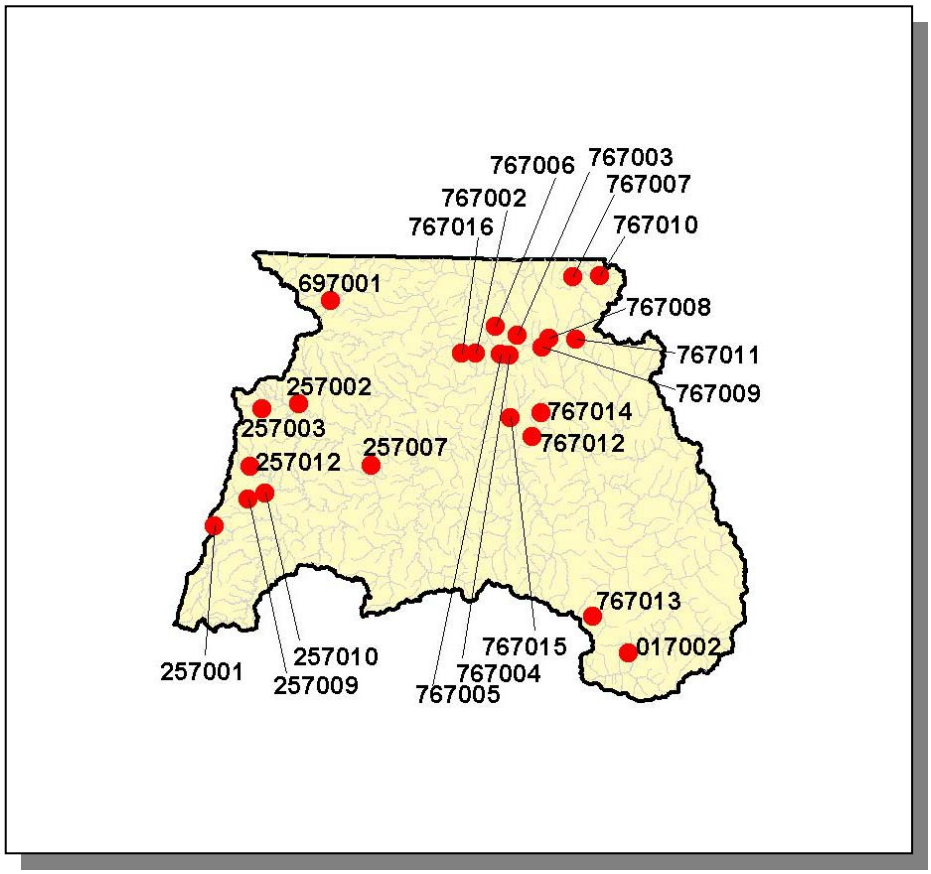

Figure 2-5. Location of Inventoried Dams in the Tennessee Portion of the South Fork Cumberland River Watershed. *More information is provided in Appendix II and at http://gwidc.memphis.edu/website/dws/.*

2.4. LAND USE. Land Use/Land Cover information was provided by EPA Region 4 and was interpreted from 1992 Multi-Resolution Land Cover (MRLC) satellite imagery.

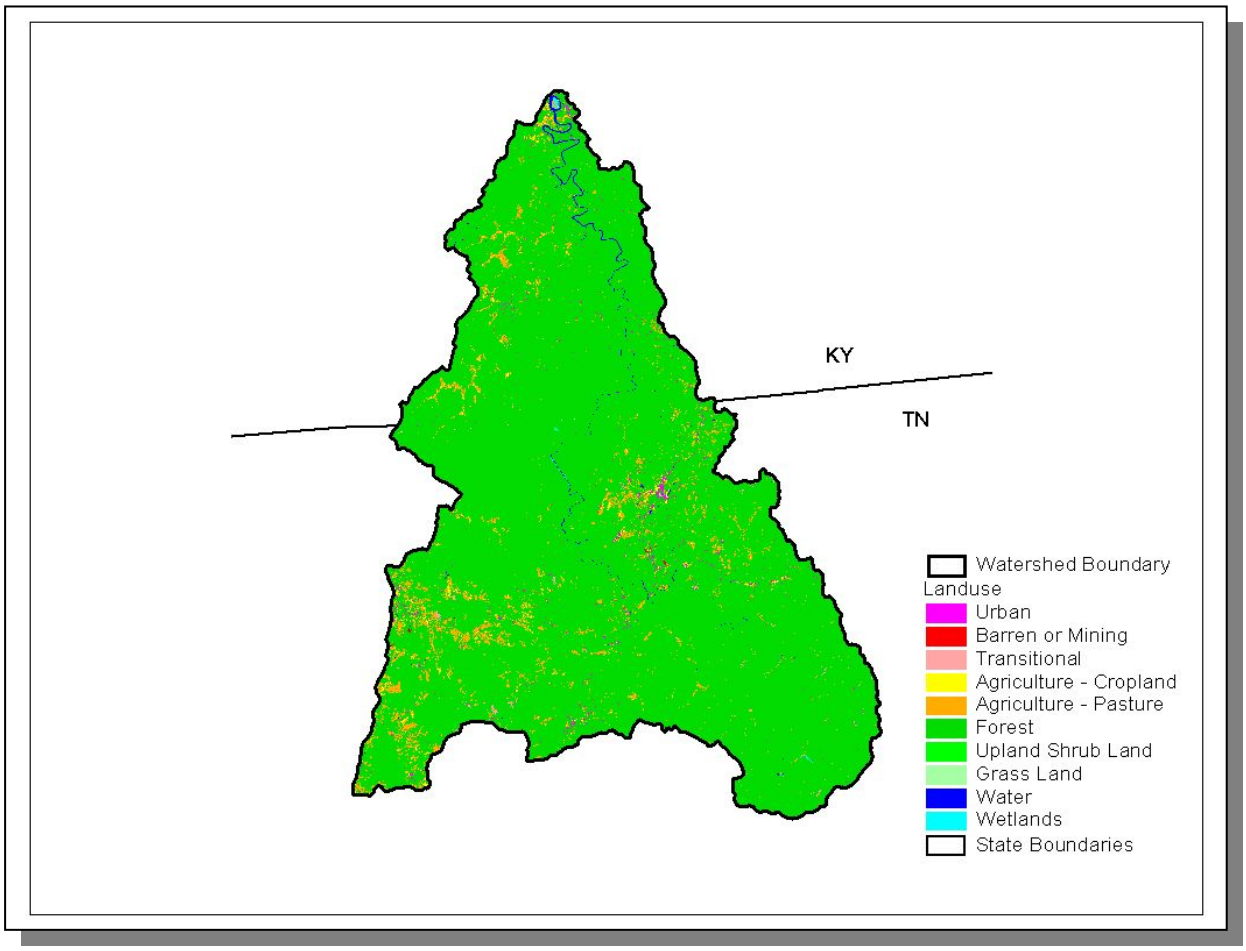

Figure 2-6. Illustration of Select Land Cover/Land Use Data from MRLC Satellite Imagery.

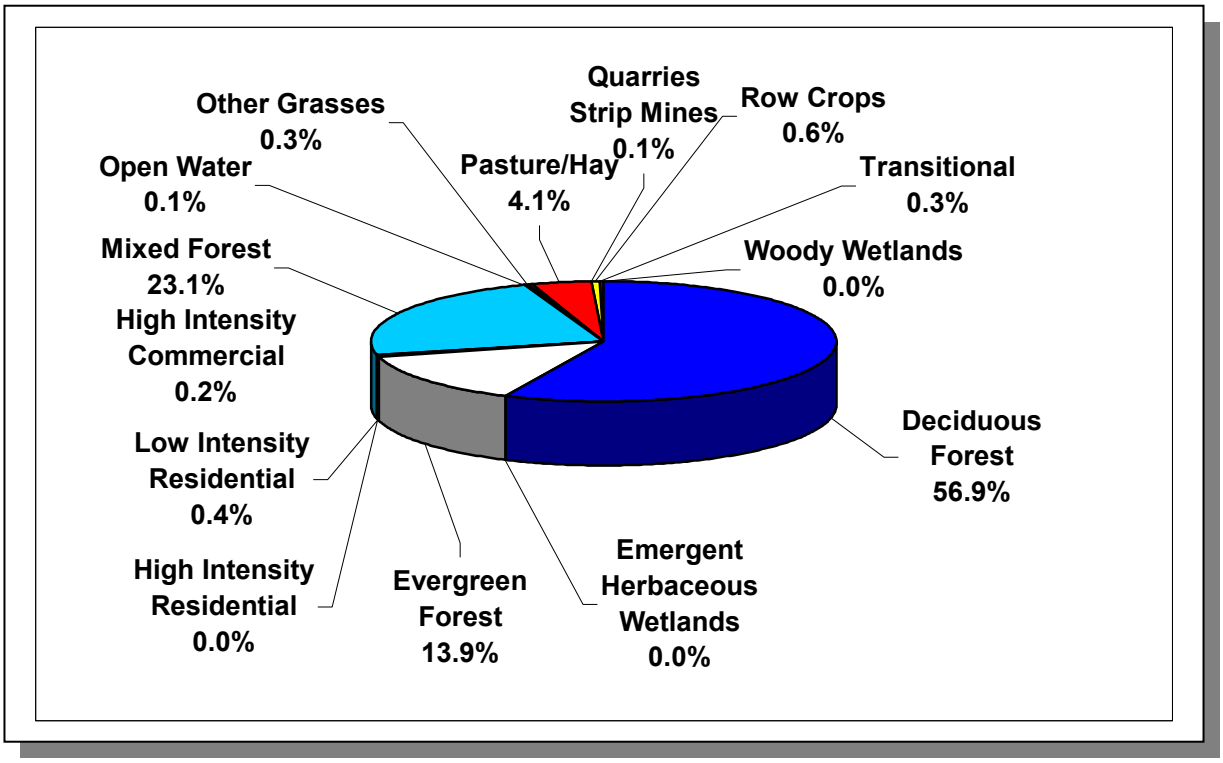

Figure 2-7. Land Use Distribution in the Tennessee Portion of the South Fork Cumberland River Watershed. *More information is provided in Appendix II.*

Sinkholes, springs, disappearing streams and caves characterize karst topography. The term "karst" describes a distinctive landform that indicates dissolution of underlying soluble rocks by surface water or ground water. Although commonly associated with limestone and dolomite (carbonate rocks), other highly soluble rocks such as gypsum and rock salt can be sculpted into karst terrain. In karst areas, the ground water flows through solution-enlarged channels, bedding planes and microfractures within the rock. The characteristic landforms of karst regions are: closed depressions of various size and arrangement; disrupted surface drainage; and caves and underground drainage systems. The term "karst" is named after a famous region in the former country of Yugoslavia.

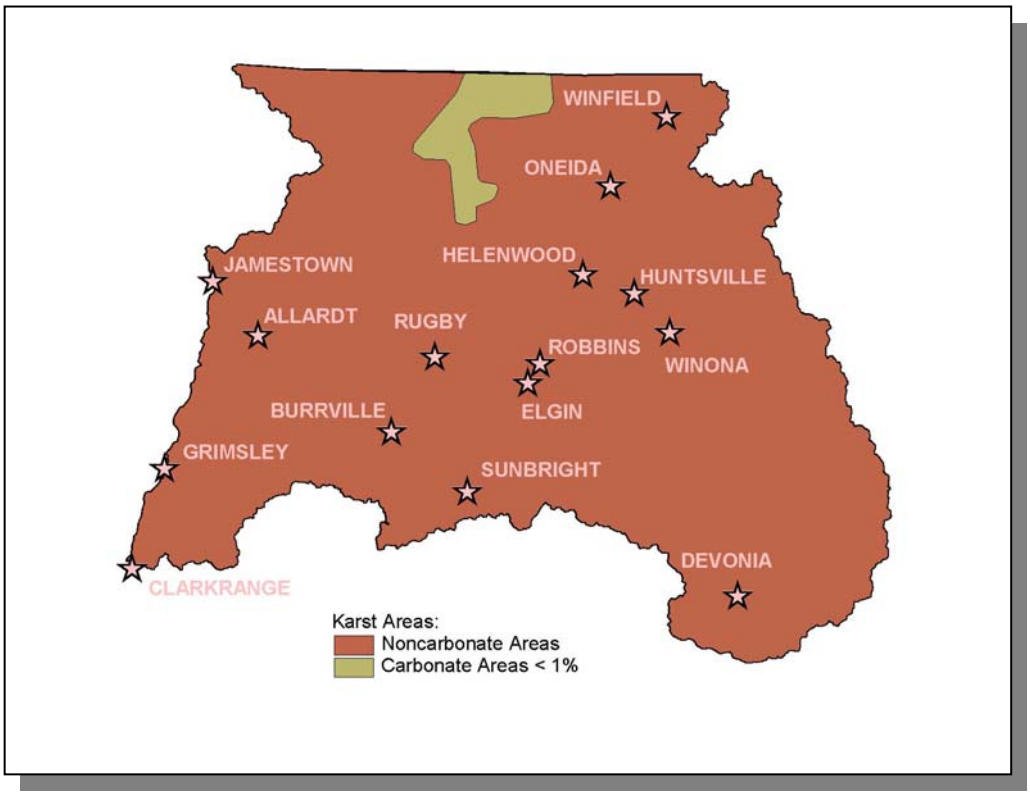

Figure 2-8. Illustration of Karst Areas in the Tennessee Portion of the South Fork Cumberland River Watershed. *Locations of communities in the watershed are shown for reference.*

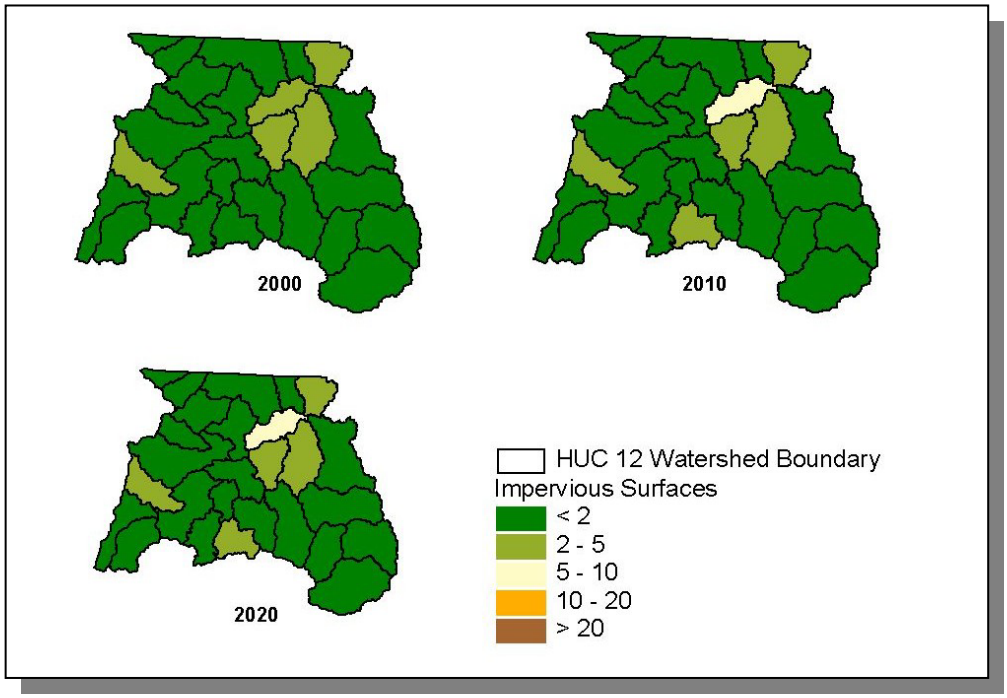

Figure 2-9. Illustration of Total Impervious Area in the Tennessee Portion of the South Fork Cumberland River Watershed. *All HUC-12 subwatersheds are shown. Current and projected total impervious cover is provided by EPA Region 4. More information can be found at: http://www.epa.gov/ATHENS/research/impervious/*

2.5. ECOREGIONS AND REFERENCE STREAMS. Ecoregions are relatively homogeneous areas of similar geography, topography, climate and soils that support similar plant and animal life. Ecoregions serve as a spatial framework for the assessment, management, and monitoring of ecosystems and ecosystem components. Ecoregion studies can aid the selection of regional stream reference sites, identifying high quality waters, and developing ecoregion-specific chemical and biological water quality criteria.

There are eight Level III Ecoregions and twenty-five Level IV subecoregions in Tennessee. The Tennessee portion of the South Fork Cumberland River Watershed lies within 2 Level III ecoregions (Southwestern Appalachians and Central Appalachians) and contains 3 Level IV subecoregions:

- The **Cumberland Plateau (68a)** tablelands and open low mountains are about 1000 feet higher than to the west, and receive slightly more precipitation with cooler annual temperatures than the surrounding lower-elevation ecoregions. The plateau surface is less dissected with lower relief compared to the Cumberland Mountains or the Plateau Escarpment (68c). Elevations are generally 1200-2000 feet, with the Crab Orchard Mountains reaching over 3000 feet. Pennsylvania-age conglomerate, sandstone, siltstone, and shale is covered by mostly well-drained, acidic soils of low fertility. The region is forested, with some agriculture and coal mining activities.

- The **Plateau Escarpment (68c)** is characterized by steep, forested slopes and high velocity, high gradient streams. Local relief is often 1000 feet or more. The geologic strata include Mississippian-age limestone, sandstone, shale, and siltstone, and Pennsylvania-age shale, siltstone, sandstone, and conglomerate. Streams have cut down into the limestone, but the gorge talus slopes are composed of colluvium with huge angular, slabby blocks of sandstone. Vegetation community types in the ravines and gorges include mixed oak and chestnut oak on the upper slopes, more mesic forests on the middle and lower slopes (beech-tulip poplar, sugar maple-basswood-ash-buckeye), with hemlock along rocky streamsides and river birch along floodplain terraces.

- The **Cumberland Mountains (69d)**, in contrast to the sandstone-dominated Cumberland Plateau (68a) to the west and southwest, are more highly dissected, with narrow-crested steep slopes, and younger Pennsylvanian-age shales, sandstones, siltstones, and coal. Narrow, winding valleys separate the mountain ridges, and relief is often 2000 feet. Cross Mountain, west of Lake City, reaches 3534 feet in elevation. Soils are generally well-drained, loamy, and acidic, with low fertility. The natural vegetation is a mixed mesophytic forest, although composition and abundance vary greatly depending on aspect, slope position, and degree of shading from adjacent land masses. Large tracts of land are owned by lumber and coal companies, and there are many areas of stripmining.

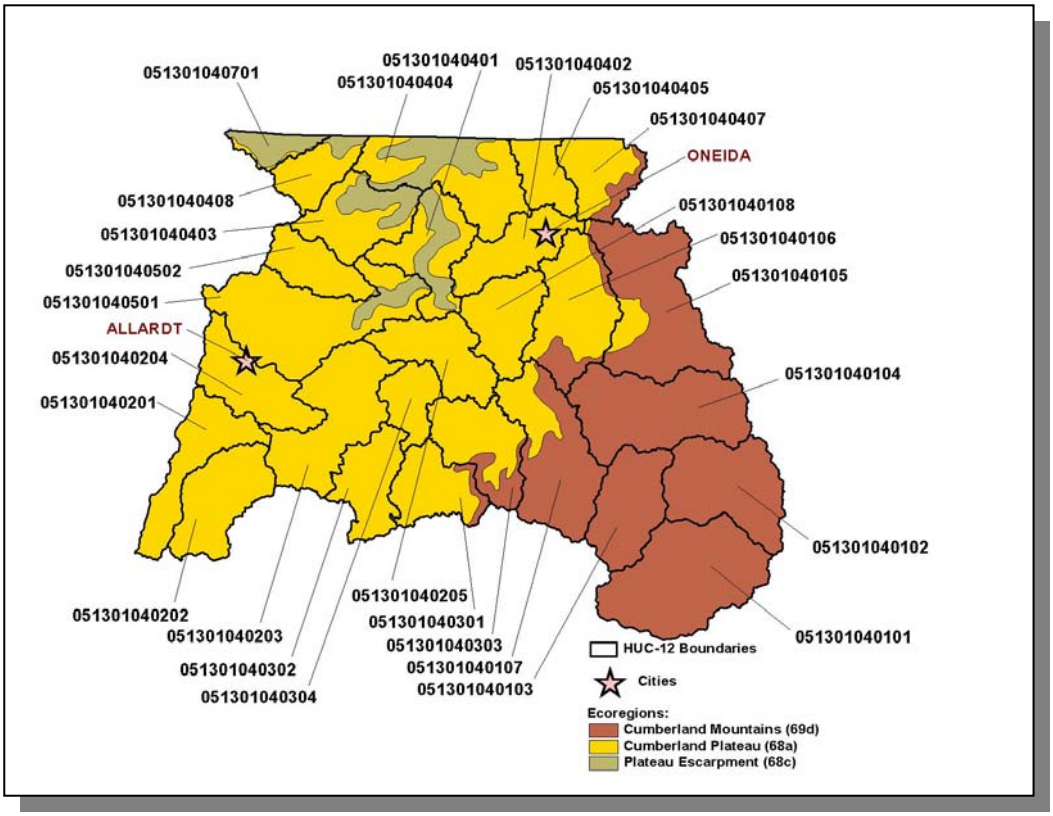

Figure 2-10. Level IV Ecoregions in the Tennessee Portion of the South Fork Cumberland River Watershed. *Locations of Allardt and Oneida are shown for reference.*

Each Level IV Ecoregion has at least one reference stream associated with it. A reference stream represents a least impacted condition and may not be representative of a pristine condition.

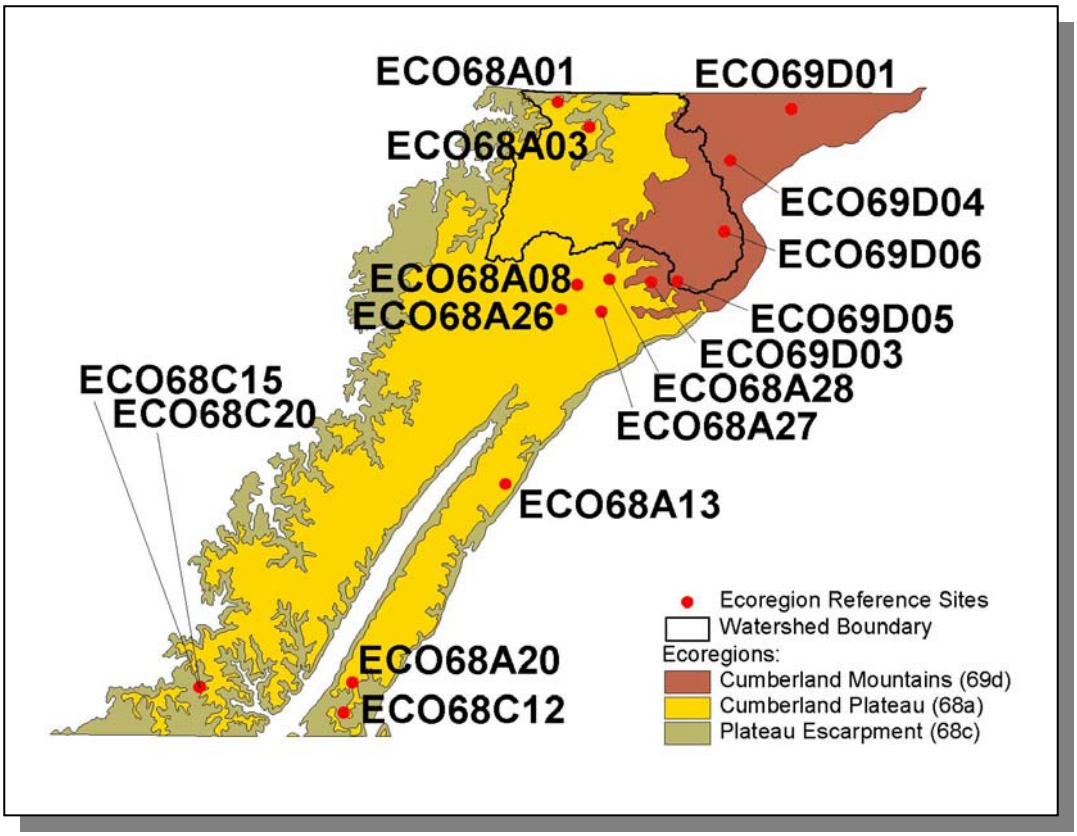

Figure 2-11. Ecoregion Monitoring Sites in Level IV Ecoregions 68a, 68c, and 69d. *The Tennessee portion of the South Fork Cumberland River Watershed is shown for reference. More information, including which ecoregion reference sites were inactive or dropped prior to 01/01/2006, is provided in Appendix II.*

2.6. NATURAL RESOURCES.

2.6.A. Designated State Natural Area. The Natural Areas Program was established in 1971 with the passage of the Natural Areas Preservation Act. TDEC/Division of Natural Heritage administers the State Natural Areas program. Further information may be found at http://www.state.tn.us/environment/nh/natareas/

The Tennessee portion of the South Fork Cumberland River Watershed has four Designated State Natural Area:

Colditz Cove Class II Natural-Scientific State Natural Area is a 165-acre natural area located approximately 2 miles east of Allardt, Tennessee in Fentress County. Its most impressive feature is Northrup Falls, which plunges more than 60 feet over a protruding rock ledge into a scenic, narrow, gorge along Big Branch Creek. The waterfall is named for the family who settled here and operated a mill above the falls in the 1800's. These high cliffs and "rock houses" (cave-like overhangs) at the falls and along the creek gorge, were once used by cliff-dwelling Woodland Indians over 3,000 years ago for shelter while hunting.

Frozen Head Class I Scenic-Recreational State Natural Area and Class II Natural Scientific State Natural Area is an 11,320-acre natural area in Morgan County. It is one of the crown jewels of Tennessee's Cumberland Mountain range and is an excellent example of what presettlement conditions might have been like here hundreds of years ago. The Cumberland Mountains occupy the northeast section of the Cumberland Plateau and has an elevation range that rises more than 1,000 feet above the Plateau. The highest peak in the natural area occurs on Frozen Head Mountain at 3,324 feet elevation. There are thirteen other peaks in the natural area rising above 3,000 feet elevation. The name "Frozen Head" derives from the peaks that are often capped in a shroud of snow or ice in winter. The majority of this land was acquired by the State in early 1900's to become a state forest for hardwood timber production, but very little timber was ever harvested.

Honey Creek Pocket Wilderness Class II Natural-Scientific State Natural Area is a 109-acre natural area in Pickett County. It is one of two designated state natural areas located in the Big South Fork National River and Recreation Area (BSFNRRA) owned and managed by the National Park Service. It was previously a Bowater Pocket Wilderness Area before the BSFNRRA was established. One of its most outstanding features is the incredibly scenic overlook 250 feet above the South Fork of Cumberland River.

Twin Arches Class II Natural-Scientific State Natural Area is approximately 1,500 acres located in Scott and Pickett Counties and contains two impressive geological formations known as the Twin Arches. These arches form the largest natural bridge complex known in Tennessee and represent one of the world's largest such complexes. The two sandstone arches are situated end-to-end, and are commonly referred to as the North and South Arches.

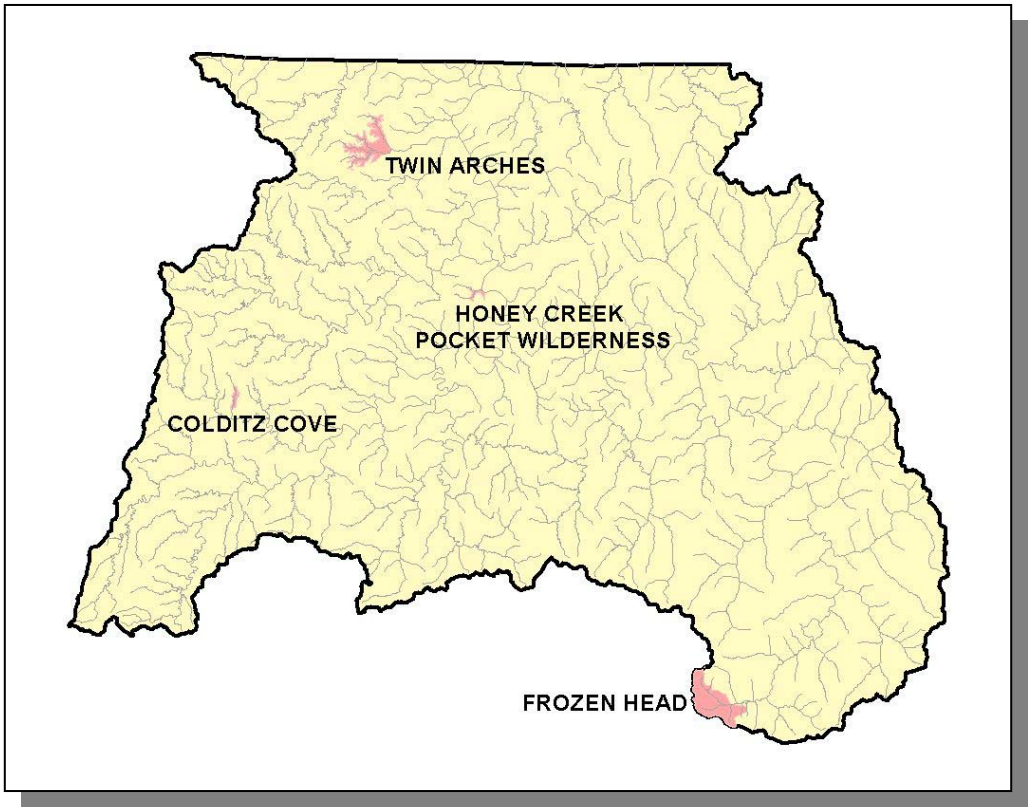

Figure 2-12. There are Four Designated State Natural Areas in the Tennessee Portion of the South Fork Cumberland River Watershed.

2.6.B. Rare Plants and Animals. The Heritage Program in the TDEC Division of Natural Heritage maintains a database of rare species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, the US Fish and Wildlife Service, and the Tennessee Valley Authority. The information is used to: 1) track the occurrence of rare species in order to accomplish the goals of site conservation planning and protection of biological diversity, 2) identify the need for, and status of, recovery plans, and 3) conduct environmental reviews in compliance with the federal Endangered Species Act.

GROUPING	NUMBER OF RARE SPECIES
Crustaceans	3
Mussels	5
Amphibians	5
Birds	4
Fish	8
Mammals	8
Reptiles	2
Plants	53
Total	**88**

Table 2-3. There are 78 Known Rare Plant and Animal Species in the Tennessee Portion of the South Fork Cumberland River Watershed.

In the Tennessee portion of the South Fork Cumberland River Watershed, there are nine known rare fish species, five known rare mussel species, and three known rare crustacean species.

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS
Ammocrypta asprella	Crystal darter		D
Etheostoma baileyi	Emerald darter		D
Eheostoma cinereum	Ashy darter		T
Etheostoma percnurum	Duskytail darter	LE	E
Eheostoma sagitta	Arrow darter		D
Etheostoma tippecanoe	Tippicanoe darter		D
Percina squamata	Olive darter		D
Phoxinus cumberlandensis	Blackside dace	LT	T
Alasmidonta atropurpurea	Cumberland elktoe	LE	E
Epioblasma brevidens	Cumberland combshell	LE	E
Epioblasma florentina walkeri	Tan riffleshell	LE	E
Pegios fibula	Little-wing pearlymussel	LE	E
Villosa trabalis	Cumberland bean	LE	E
Cambarus bouchardi	Big South Fork crayfish		E
Cambarus crinipes	Bouchard's crayfish		
Orconectes australis	A crayfish		

Table 2-4. Rare Aquatic Species in the Tennessee Portion of the South Fork Cumberland River Watershed. *Federal Status: LE, Listed Endangered by the U.S. Fish and Wildlife Service; LT, Listed Threatened by the U.S. Fish and Wildlife Service. State Status: T, Listed Threatened by the Tennessee Wildlife Resources Agency; E, Listed Endangered by the Tennessee Wildlife Resources Agency; D, Deemed in Need of Management by the Tennessee Wildlife Resources Agency. More information may be found at http://www.state.tn.us/environment/na/.*

2.6.C. Wetlands. The Division of Natural Heritage maintains a database of wetland records in Tennessee. These records are a compilation of field data from wetland sites inventoried by various state and federal agencies. Maintaining this database is part of Tennessee's Wetland Strategy, which is described at:

http://www.state.tn.us/environment/nh/wetlands/

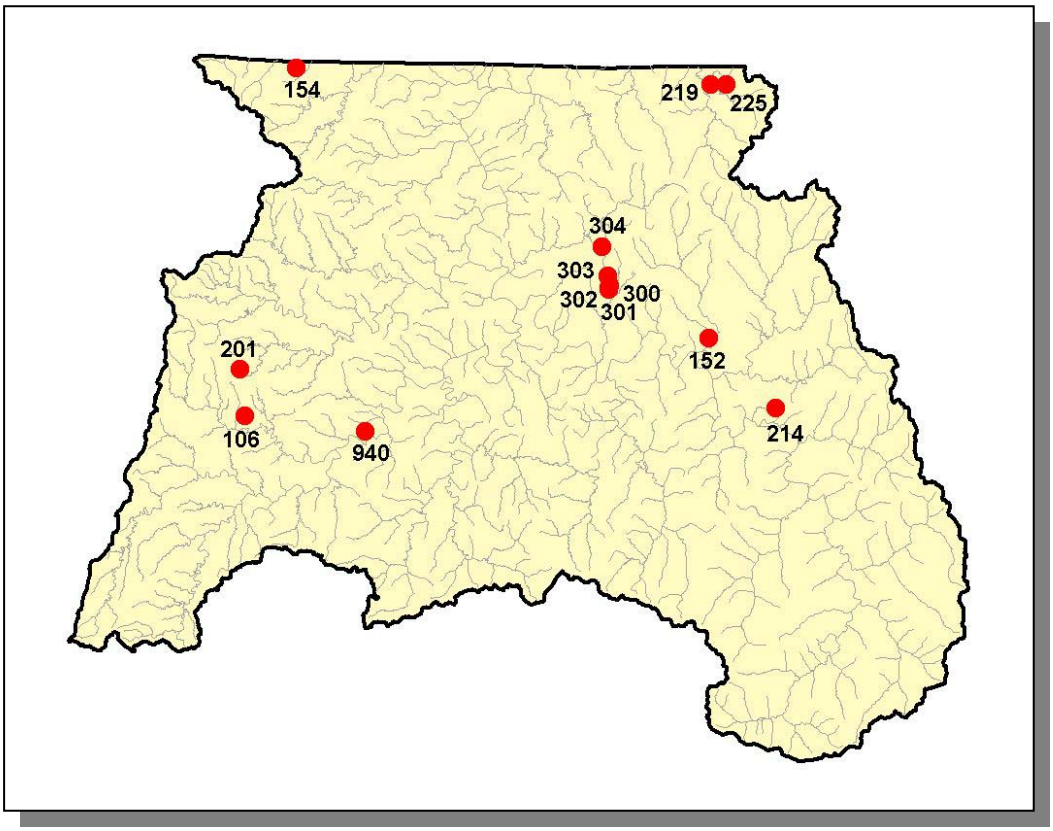

Figure 2-13. Location of Wetland Sites in TDEC Division of Natural Heritage Database in Tennessee Portion of the South Fork Cumberland River Watershed. ***This map represents an incomplete inventory and should not be considered a dependable indicator of the presence of wetlands.*** *There may be additional wetland sites in the watershed. More information is provided in Appendix II.*

2.7. CULTURAL RESOURCES.

2.7.A. Nationwide Rivers Inventory. The Nationwide Rivers Inventory, required under the Federal Wild and Scenic Rivers Act of 1968, is a listing of free-flowing rivers that are believed to possess one or more outstanding natural or cultural values. Exceptional scenery, fishing or boating, unusual geologic formations, rare plant and animal life, cultural or historic artifacts that are judged to be of more than local or regional significance are the values that qualify a river segment for listing. The Tennessee Department of Environment and Conservation and the Rivers and Trails Conservation Assistance branch of the National Park Service jointly compile the Nationwide Rivers Inventory from time to time (most recently in 1997). Under a 1980 directive from the President's Council on Environmental Quality, all Federal agencies must seek to avoid or mitigate actions that would have an adverse effect on Nationwide Rivers Inventory segments.

The most recent version of the Nationwide Rivers Inventory lists portions of eight streams in the Tennessee portion of the South Fork Cumberland River Watershed:

Big South Fork Cumberland River (RM 55 to RM 76) is an outstanding popular white water, rugged, forested area with highly scenic values and numerous archaeological sites.

Clear Fork of South Fork Cumberland River, including North Prong (RM 0 to RM 44) is a scenic stream with close steep valley walls, long pools, moderate rapids, and short, quick drops.

Crooked Creek (RM 0 to RM 18) flows through the Colditz Cove State Natural Area.

Little South Fork Cumberland River (RM 32 to RM 34) is a forested, highly scenic and sparsely developed stream with deep channels with large boulders and rock ledges.

New River (RM 0 to RM 9) is a placid winding stream that flows through a steep-sided valley with some Class I-III rapids and a gorge area.

North Whiteoak Creek (RM 0 to RM 25) is a rocky, scenic stream with a four hundred foot deep gorge area, moderate white water, and small waterfalls.

Rock Creek (RM 22 to RM 31) is a beautiful stream in wild terrain with deep, narrow valleys and wooded hillsides.

Whiteoak Creek (RM 0 to RM 17) is a scenic float stream of historic significance.

RIVER	SCENIC	RECREATION	GEOLOGIC	FISH	WILDLIFE	HISTORIC	CULTURAL
Big South Fork	X	X	X	X	X	X	X
Clear Fork	X	X	X		X		
Crooked Creek	X	X	X	X	X		
Little South Fork	X	X	X				
New River	X	X	X				
North Whiteoak Creek	X	X	X				
Rock Creek	X	X	X	X	X		
Whiteoak Creek	X	X				X	X

Table 2-5. Attributes of Streams Listed in the Nationwide Rivers Inventory.

Additional information may be found online at http://www.ncrc.nps.gov/rtca/nri/

2.7.B. Outstanding National Resource Waters. Tennessee waters with the highest degree of protection are identified as Outstanding National Resource Waters (ONRW). These waters are specifically designated by the Water Quality Control Board and are listed in Tennessee's Water Quality Standards. No new discharges, expansions of existing discharges, or other regulated activities that would cause degradation may be permitted in these waters.

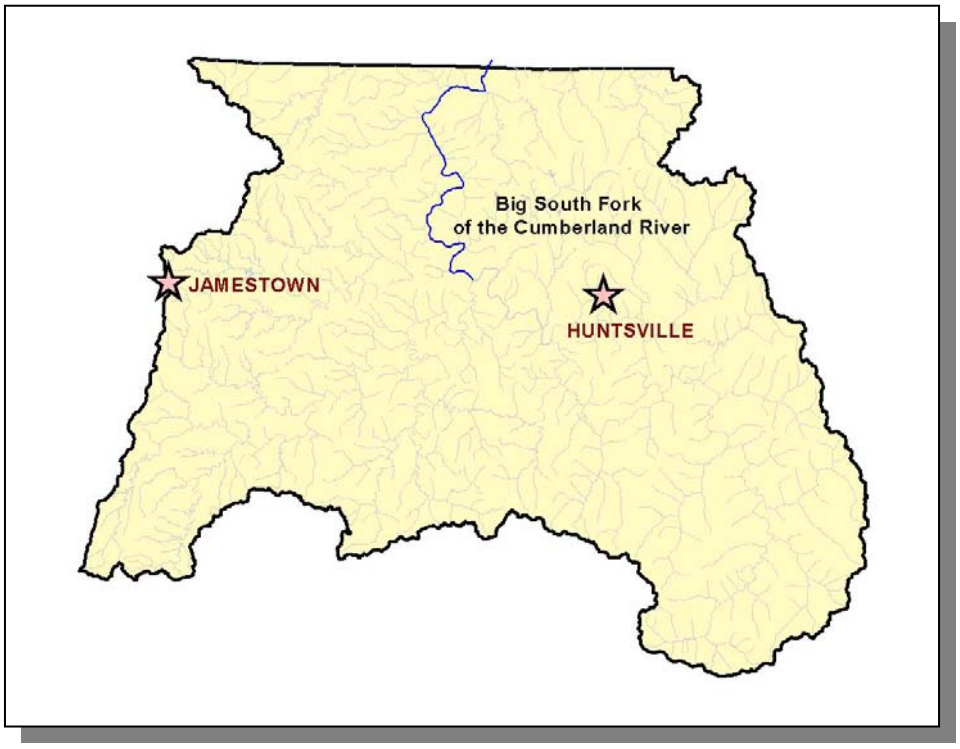

Figure 2-14. The Big South Fork of the Cumberland River Within the Big South Fork National River and Recreation Area has been Designated an Outstanding National Resource Water by the Water Quality Control Board.

2.7.C. Public Lands. Some sites representative of the cultural heritage are under state or federal protection:

- Big South Fork National River and Recreation Area covers 125,000 acres in Tennessee and Kentucky. The U.S. Army Corps of Engineers is charged with land acquisition, planning, and development of the Park, and the National Park Service is responsible for operation and maintenance. More information may be found at http://www.nps.gov/biso/

- Cumberland Forest, established in 1947, is the largest field research unit in the University Forest Resources Research and Education Center. The 8,000-acre forest includes parts of Morgan and Scott Counties. More information may be found at http://forestry.tennessee.edu/Cuforest.html

- Frozen Head State Natural Area is an 11,300-acre natural area in Morgan County. (see Section 2.6.A for more information). More information may be found at http://www.state.tn.us/environment/parks/parks/FrozenHead

- Pickett State Forest is an 18,085-acre tract designated as a state forest in 1935, after the Sterns Coal and Lumber Company donated the land in 1933. More information may be found at http://www.state.tn.us/agriculture/forestry/stateforests/10.html

- Pickett State Park is a 17,372-acre park with uncommon rock formations, natural bridges, numerous caves and signs of ancient Native Americans. More information may be found at http://www.state.tn.us/environment/parks/parks/Pickett/

- Pickett State Forest Wildlife Management Area is an 11,000-acre area managed by TWRA in Pickett County.

- Royal Blue Wildlife Management Area is part of a 50,000-acre wilderness. More information my be found at:
  http://www.cs.utk.edu/~dunigan/mtnbike/royal.html

- Scott State Forest is a 2,827-acre tract located in Scott and Fentress Counties and is completely surrounded by the Big South Fork National River and Recreation Area. More information may be found at:
  http://www.state.tn.us/agriculture/forestry/stateforests/11.html

- Sundquist Wildlife Management Area is a 73,000-acre area managed by TWRA in Anderson, Campbell, and Scott Counties.

- Tally Wilderness is located in Pickett County, adjacent to Pickett State Forest. The preserve was donated to The Nature Conservancy as a gift. More information may be found at:
  http://www.nature.org/wherewework/northamerica/states/tennessee/preserves/art10126.html

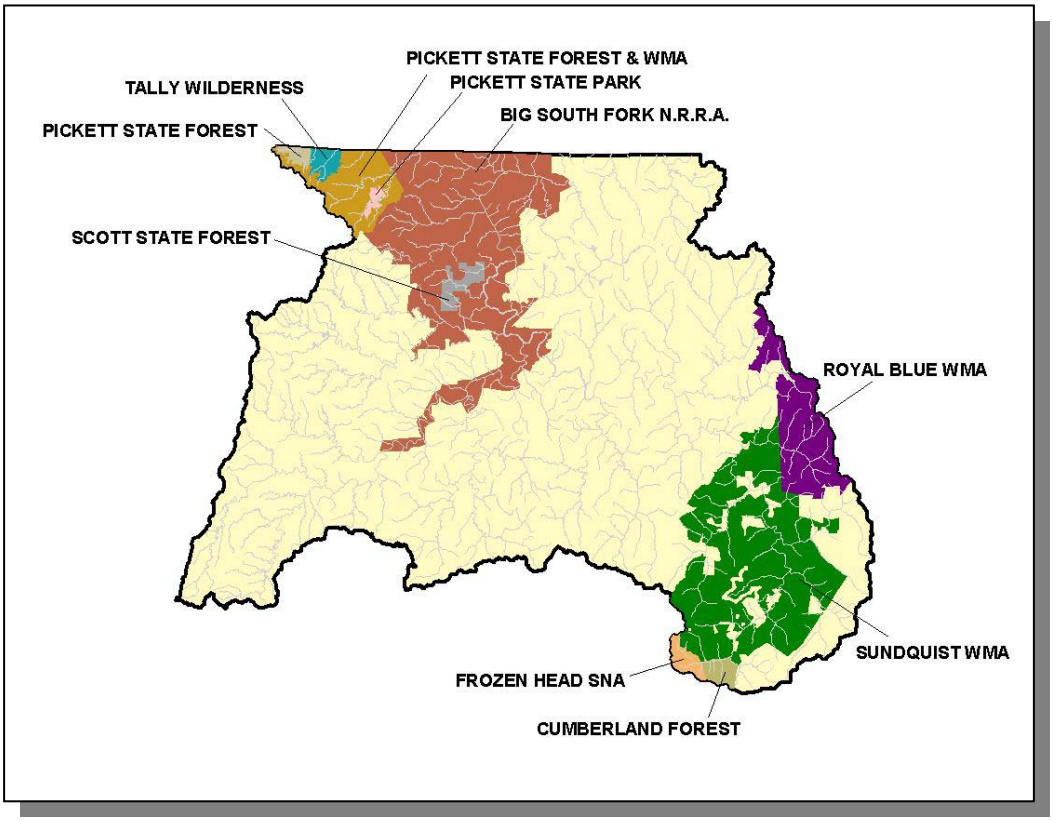

Figure 2-14. Public Lands in the Tennessee Portion of the South Fork Cumberland River Watershed. *Data are from Tennessee Wildlife Resources Agency. NRRA, National River and Recreation Area; SNA, State Natural Area; WMA, Wildlife Management Area.*

2.8. TENNESSEE RIVERS ASSESSMENT PROJECT. The Tennessee Rivers Assessment is part of a national program operating under the guidance of the National Park Service's Rivers and Trails Conservation Assistance Program. The Assessment is an inventory of river resources, and should not be confused with "Assessment" as defined by the Environmental Protection Agency. A more complete description can be found in the Tennessee Rivers Assessment Summary Report, which is available from the Department of Environment and Conservation and on the web at:

http://www.state.tn.us/environment/wpc/publications/riv/

STREAM	NSQ	RB	RF	STREAM	NSQ	RB	RF
Beech Fork Creek	2			New River	1,2	1,2	4
Big South Fork of the Cumberland River	1	1,2		No Business Creek	2		
Black Wolf Creek	2	3		North Prong Clear Fork		2	
Bone Camp Creek	2			North White Oak Creek	1	2	
Bridges Creek	2			Paint Rock Creek	2		
Brimstone Creek	1	3		Pine Creek	4		
Buffalo Creek	1			Puncheon Camp Creek	2		
Clear Fork River	1,2	1,2	2	Roaring Paunch Creek	2		
Crooked Creek	2			Rock Creek	1		
East Branch Bear Creek	3			Rockhouse Fork Creek	2		
Grassey Creek	2			Shoal Creek	2		
Langham Btranch Creek	1			Smith Creek	2		
Laurel Creek	1			Smokey Creek	2		
Laurel Fork Station Camp Creek	1			South Prong Clear Fork	1		
Ligias Fork New River	2			Station Camp Creek	2		
Little South Fork Creek	1			Straight Fork Creek	2		
Marcum Creek	2			Thompson Creek	1		
Mill Creek (Trib of North White Oak Creek)	2			West Prong Hill Creek	2		
Mill Creek (Trib of Brimstone Creek)	3			White Oak Creek	1	2,3	
Montgomery Creek	2			Williams Creek			2

Table 2-6. Stream Scoring from the Tennessee Rivers Assessment Project.

Categories: NSQ, Natural and Scenic Qualities
RB, Recreational Boating
RF, Recreational Fishing

Scores: 1. Statewide or greater Significance; Excellent Fishery
2. Regional Significance; Good Fishery
3. Local Significance; Fair Fishery
4. Not a significant Resource; Not Assessed